

Space Science: Turkey Oak /Sundial

Teacher's Guide

Subject: Integrated Science (Life; Earth-Space; Physical)

Topic: Manmade Sundials and Nature's Sundial

Summary: Students will observe the position of Turkey Oak leaves in relation to the sun's position. They will also make and use their own sundials.

After completing the field lab, students will be able to:

Objective(s):

1. Make and use their own sundial
2. observe and understand how Turkey Oak leaves act as natural sundials
3. Understand the importance of water for Turkey Oak survival

Ecosystem(s): Hammocks; Pinelands; Freshwater Wetlands

Equipment:

- Tool and string to measure Turkey Oak position
- Latitude ruler copied onto cardstock. Class set.
- Protractor to measure angles
- Sharp object for piercing dial
- Camera or video recorder with still frame capability
- Sundial template copied onto cardstock. One per student.
- GPS
- scissors
- Compass
- thin, straight stick per student
- glue sticks

Background:

- **Vocabulary:** Turkey Oak, sundial, latitude ruler, rotation, axis of rotation
- **Reference Material:** McDougal Littell Science-7th grade chapter 20; Making an equatorial Sundial, pp 335-337 in teacher's edition Florida Lab Manual The History of Watches and Clocks, Sundial: <http://www.love-watches.com/History-Watches-Clocks.htm>
- **Equipment Training:** still frame use on video camera if used

Procedure (Engage; Explore; Explain)

1. You are stuck on an uninhabited island and want to keep track of time. What can you do???
2. Go over to a Turkey Oak that has been set up with string so students can observe its current position. Have them record the observed angle.
3. Walk students over to picnic tables. Hand out supplies.
4. Have students cut out sundial then glue two halves together
5. Have students or teacher poke a small hole in the center of the circle.
6. Use GPS to find latitude. Put a mark on the latitude ruler for latitude. Students may need to estimate. Mark one end of straight stick to bottom. Place this end of the stick at the line marked bottom on the latitude ruler. Measure the stick to your latitude line and mark this distance on the stick.
7. Push the top of the stick into the center of the south face of the dial. Adjust the stick so the dial is at the latitude mark. Make sure the dial is perpendicular to the stick.
8. Carefully point the top end of the stick directly north. Rest the bottom of the stick and the folded bottom of the dial on a flat surface.
9. Use the season of the year to determine whether you should read the sundial's north face or its south face. Use the center of the shadow to estimate the time several times.

Sunshine State Standards:

Science: SC.E.1.3.1; SC.H.1.3.5; SC.H.2.3.1; **Language Arts:** LA.A.2.3.5; LA.A.2.3.7

Mathematics: MA.A.1.3.3; MA.B.1.3.2; MA.B.4.3.1; MA.C.1.3.1; **Social Studies:** SS.B.2.3.7

Space Science: Turkey Oak Sundial

Student Data Sheet

General Information

Full Name:		Date:	
School (teacher):		Time:	
Latitude:		Longitude:	

Hypothesis If the earliest ways of telling time were by observing nature than I hypothesis that a noticeable change in the angle of Turkey Oak leaves (choose one: will be/ will not be) observed enough to tell the time of day because..._____.

Field Observations/Measurements/Data

Time Turkey Oak observed	Angle of Turkey Oak Leaf (use a protractor to measure)	Drawing of angle of Turkey Oak Leaf (be as accurate as possible)

Observation number	1	2	3	4
Clock time				
Sundial time				
Sundial face used (north or south)				
Difference (in minutes)				

Turkey Oak /Sundial

Assessment

1. Did the position of the Turkey Oak Leaf change in relation to the sun’s position during the times that you observed it?

2. Compare the sundial time to the time from a watch or a clock. Determine whether the sundial’s reading is ahead or behind the clock time. Did this remain constant every time you checked your sundial?

3. Many sundials are set up to stay in place for years at a time. Why might this be useful?

4. Would your sundial be good to use to help you get to school on time? Why or why not?

5. Imagine that Fort White’s population has exploded and there are houses and subdivisions everywhere. People are now using too much water from the aquifer and the result is a lower water table. How might this affect the Turkey Oak as a sundial? How does it affect the sundial you made? (or does it?)
